

CLAIMS

WHAT IS CLAIMED IS:

- 1 1. A glow discharge emission spectroscopy analysis apparatus having a
2 glow discharge chamber with an anode comprising:
3 a holding member for mounting a sample to be analyzed in operative
4 contact with the glow discharge chamber;
5 an inert gas is positioned in contact with a surface of the sample under
6 a pressure condition to enable a sputtering in the glow discharge chamber;
7 a power source of one of a high frequency voltage and a DC voltage is
8 provided to the glow discharge chamber; and
9 means for mounting the sample at the same potential of a negative side
10 of the power source so that the sample performs as a cathode to the anode of
11 the glow discharge chamber and a glow discharge is emitted from the
12 sputtering effect of the plasma on the sample; and
13 means for analyzing the emission from the glow discharge.
- 1 2. A glow discharge emission spectroscopic analysis apparatus according
2 to Claim 1 wherein the inert gas is one of argon, neon, helium and a mixture thereof.
- 1 3. A glow discharge emission spectroscopic analysis apparatus according
2 to Claim 1 wherein means for maintaining the sample at the same potential as that of a
3 negative side of said high-frequency voltage or DC voltage is a metallic flat member.
- 1 4. A glow discharge emission spectroscopic analysis apparatus according
2 to Claim 1 wherein the flat member is tightly attached to the surface of the sample.

3 5. In a glow discharge spectrometer for generating a glow discharge by
4 arranging a sample to face an anode of a glow discharge tube provided in a Faraday
5 cage with inert gas adjacent a surface of the sample under low pressure condition and
6 high frequency voltage or DC voltage applied between the sample and the anode, for
7 analyzing the glow discharge generated, the glow discharge spectrometer
8 improvement comprising:

9 a first and second conductor member movably mounted to receive a
10 sample therebetween;

11 a force assembly for pressing the sample to seal against the glow
12 discharge tube; and

13 an electrical connector for providing a common electrical potential to
14 the first and second conductors so that the sample acts as a cathode at a
15 uniform potential.

1 6. The invention of Claim 5, wherein one conductor member has an
2 aperture to accommodate a portion of the sample that is to be analyzed.

1 7. The invention of Claim 5, wherein the force member is a cylinder rod.

1 8. The invention of Claim 5, wherein the force member is a pair of
2 cylinder rods.

1 9. The invention of Claim 5, wherein the electrical connector is a wiper
2 member.

1 10. The invention of Claim 5, wherein one of the conductor members is
2 resiliently mounted to permit adjustable movement between the conductor member
3 and the sample when the sample is mounted between the first and second conductor
4 members.

1 11. The invention of Claim 5 further including means for applying a
2 pressurizing force to a surface of the sample opposite the anode for sealing the sample
3 to the glow discharge tube.

1 12. A method of analyzing a semiconductor wafer, comprising the steps of:
2 positioning a semiconductor wafer between a first and second
3 conductor member, the first conductor has an aperture to expose a surface of
4 the wafer and the second conductor has a corresponding section to the opposite
5 aperture for exerting a sealing force;
6 closing the first and second conductor to secure the semiconductor
7 wafer;
8 positioning the exposed surface of the semiconductor wafer to an
9 opening in a glow discharge chamber;
10 applying a force to seal the semiconductor wafer to the glow discharge
11 chamber;
12 providing a sputtering gas to the glow discharge chamber;
13 applying an electrical potential to the semiconductor wafer through the
14 first and second conductors to create a uniform negative potential of sufficient
15 magnitude to cause a plasma of the sputtering gas to erode the semiconductor
16 wafer; and
17 analyzing the glow discharge emission of light to determine the
18 elements in the semiconductor wafer.

1 13. The method of Claim 12 further including resiliently mounting at least
2 one of the first and second conductor members so that the semiconductor wafer is
3 resiliently mounted upon closing of the first and second conductor member.

1 14. The method of Claim 12 further including applying a negative high
2 frequency voltage

1 15. The method of Claim 12 further closing the first and second conductors
2 with air pressure.

1 16. An apparatus for determining the elements in a semiconductor wafer,
2 comprising:
3 a first conductor member having a central aperture and of a size larger
4 than the wafer;
5 a second conductor member of a size larger than the wafer;
6 means for opening and closing the first and second conductor members
7 to mount the wafer therebetween;
8 a glow discharge chamber apparatus having an opening adjacent the
9 central aperture of the first conductor member and an anode within the
10 chamber;
11 means for exerting a force on the wafer to seal the wafer to the glow
12 discharge chamber apparatus opening when the wafer is mounted between the
13 first and second conductors;
14 means for providing a sputtering gas to the glow discharge chamber
15 apparatus;
16 means for providing an electrical charge between the first and second
17 conductors to uniformly charge the wafer as a cathode to the anode whereby a
18 glow discharge emission is created as the wafer is sputtered; and
19 means for providing a spectroscopic analysis of the light from the glow
20 discharge emission to determine the elements in the wafer.